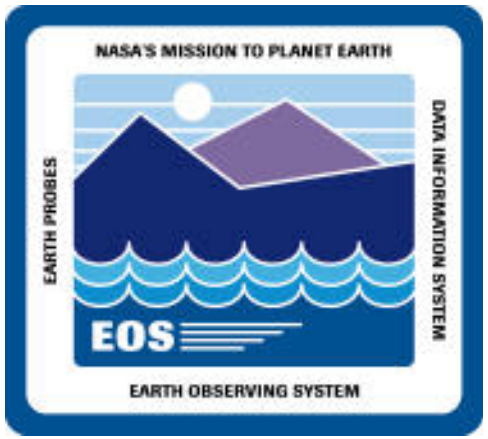


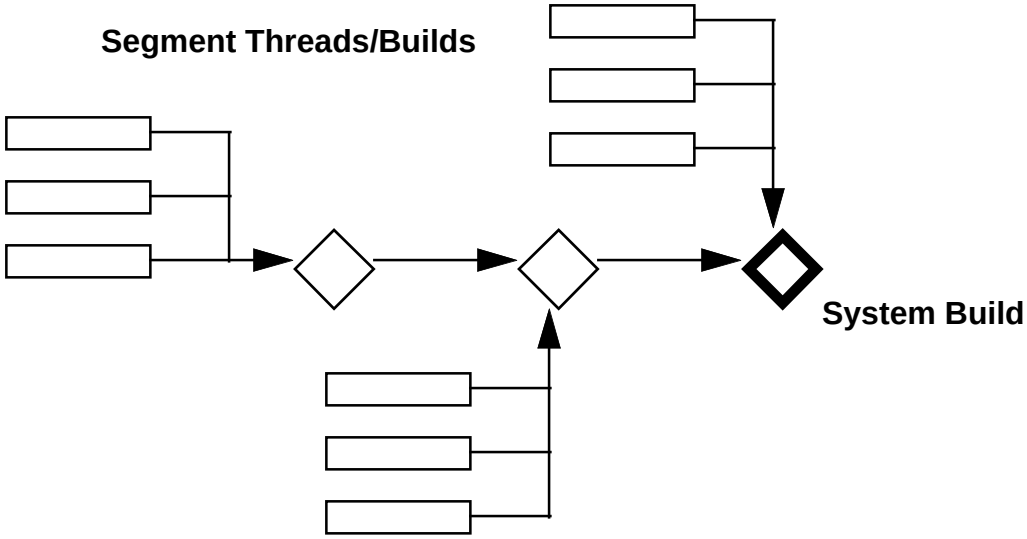
I&T Test Approach

Karen Kleis

kkleis@eos.hitc.com

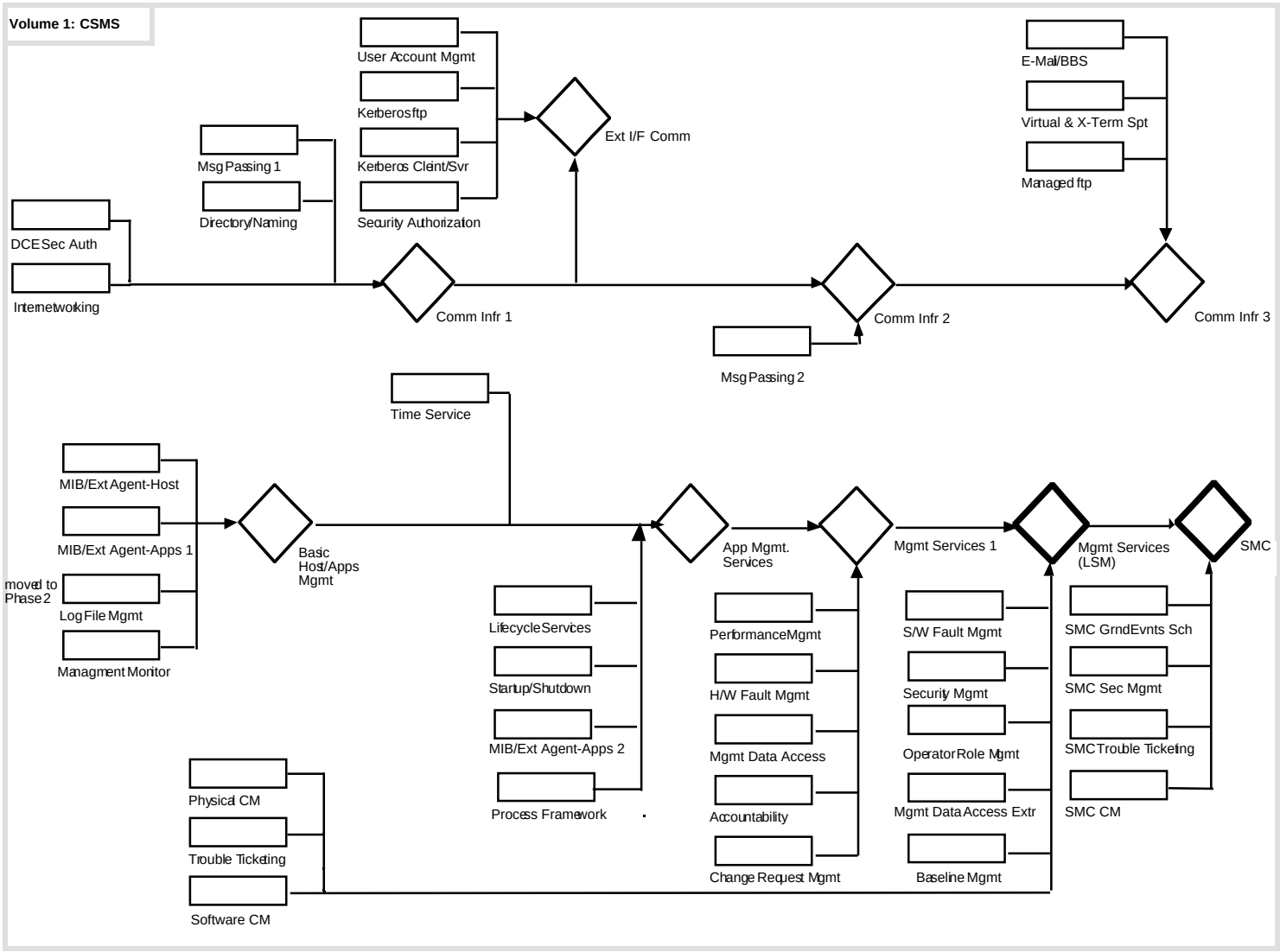
5 August 1996

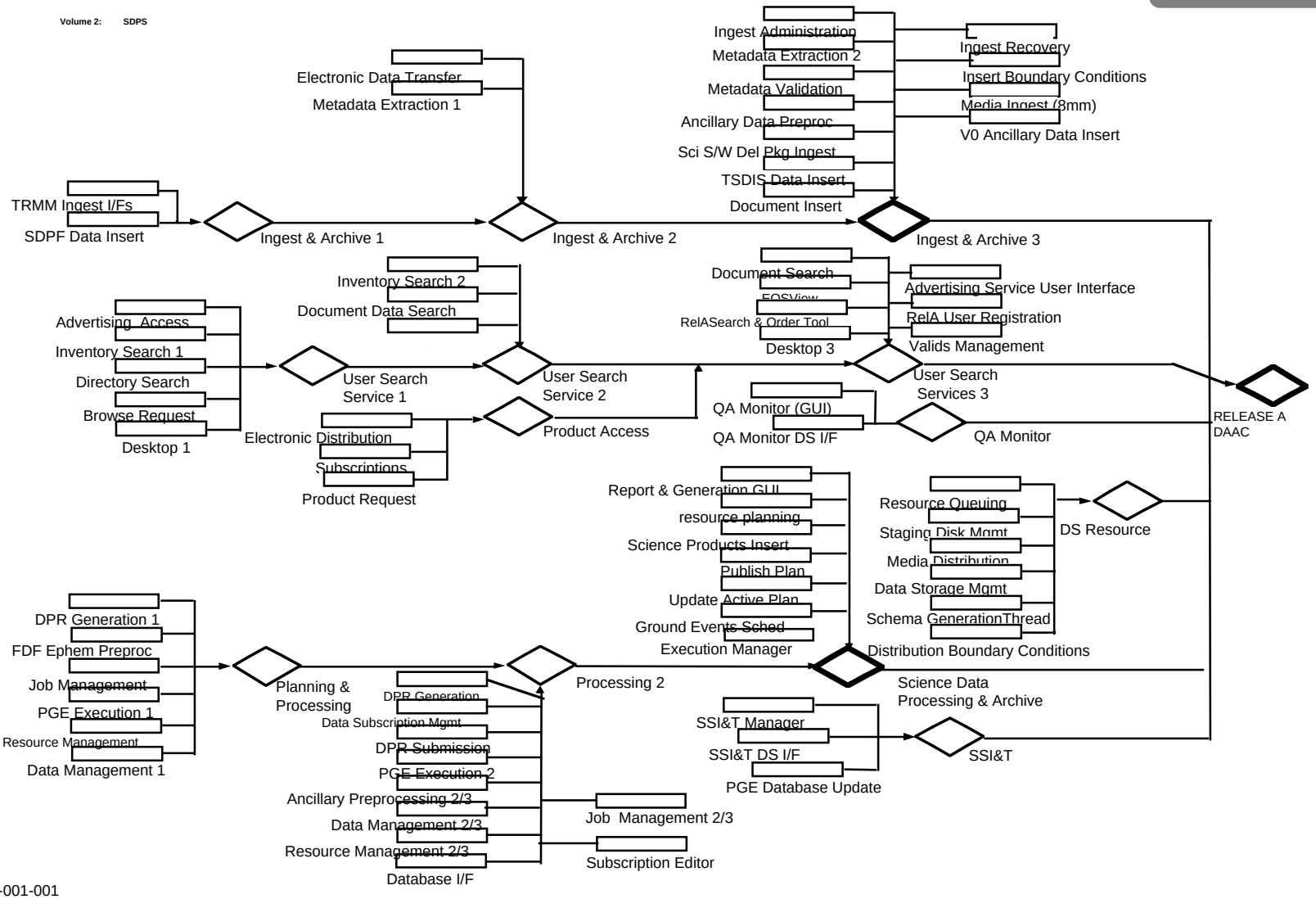
Thread/Build Methodology



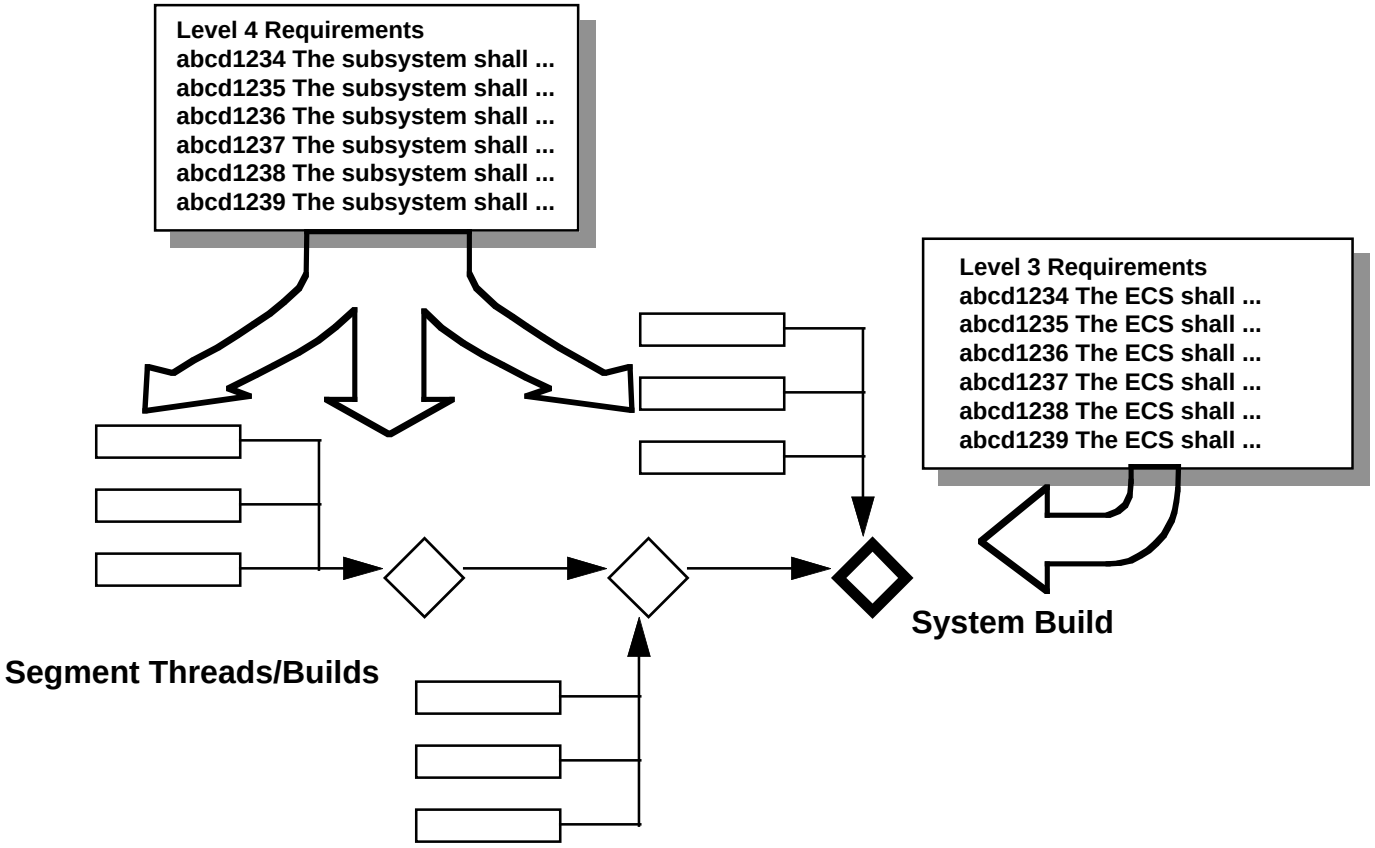
Thread/Build Methodology is an incremental build-up of capabilities

Each new capability is tested in isolation (a thread) and then integrated into an expanding set of capabilities

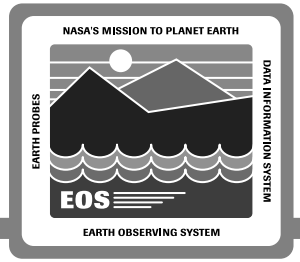

Volume 1: CSMS
User Account Mgmt
Kerberos ftp
Kerberos Cleint/Svr
Security Authorization
Ext I/F Comm
Msg Passing 1
Directory/Naming
DCE Sec Auth
Internetworking
Comm Infr 1
E-Mail/BBS
Virtual & X-Term Spt
Managed ftp
Comm Infr 2
Comm Infr 3
Msg Passing 2
Time Service
MIB/Ext Agent-Host
MIB/Ext Agent-Apps 1
moved to Phase 2
Log File Mgmt
Managment Monitor
Basic Host/Apps Mgmt
Lifecycle Services
Startup/Shutdown
MIB/Ext Agent-Apps 2
Process Framework
App Mgmt. Services
PerformanceMgmt
H/W Fault Mgmt
Mgmt Data Access
Accountability
Change Request Mgmt
Mgmt Services 1
S/W Fault Mgmt
Security Mgmt
Operator Role Mgmt
Mgmt Data Access Extr
Baseline Mgmt
Mgmt Services (LSM)
SMC
SMC GrndEvnts Sch
SMC Sec Mgmt
SMC Trouble Ticketing
SMC CM
Physical CM
Trouble Ticketing
Software CM


Electronic Data Transfer
Metadata Extraction 1
Ingest Administration
Metadata Extraction 2
Metadata Validation
Ancillary Data Preproc
Sci S/W Del Pkg Ingest
TSDIS Data Insert
Document Insert
Ingest Recovery
Insert Boundary Conditions
Media Ingest (8mm)
V0 Ancillary Data Insert
TRMM Ingest I/Fs
SDPF Data Insert
Ingest & Archive 1
Ingest & Archive 2
Ingest & Archive 3
Inventory Search 2
Document Data Search
Document Search
EOSView
RelASearch & Order Tool
Desktop 3
Advertising Service User Interface
RelA User Registration
Valids Management
Advertising Access
Inventory Search 1
Directory Search
Browse Request
Desktop 1
User Search Service 1
User Search Service 2
User Search Services 3
Electronic Distribution
Subscriptions
Product Request
Product Access
QA Monitor (GUI)
QA Monitor DS I/F
QA Monitor
RELEASE A DAAC
Report & Generation GUI
resource planning
Science Products Insert
Publish Plan
Update Active Plan
Ground Events Sched
Execution Manager
Resource Queuing
Staging Disk Mgmt
Media Distribution
Data Storage Mgmt
Schema GenerationThread
Distribution Boundary Conditions
DS Resource
DPR Generation 1
FDF Ephem Preproc
Job Management
PGE Execution 1
Resource Management
Data Management 1
Planning & Processing
DPR Generation
Data Subscription Mgmt
DPR Submission
PGE Execution 2
Ancillary Preprocessing 2/3
Data Management 2/3
Resource Management 2/3
Database I/F
Job Management 2/3
Subscription Editor
Processing 2
Science Data Processing & Archive
SSI&T Manager
SSI&T DS I/F
PGE Database Update
SSI&T

Requirements Mapping to Test Plans/Procedures



Requirements Mapping

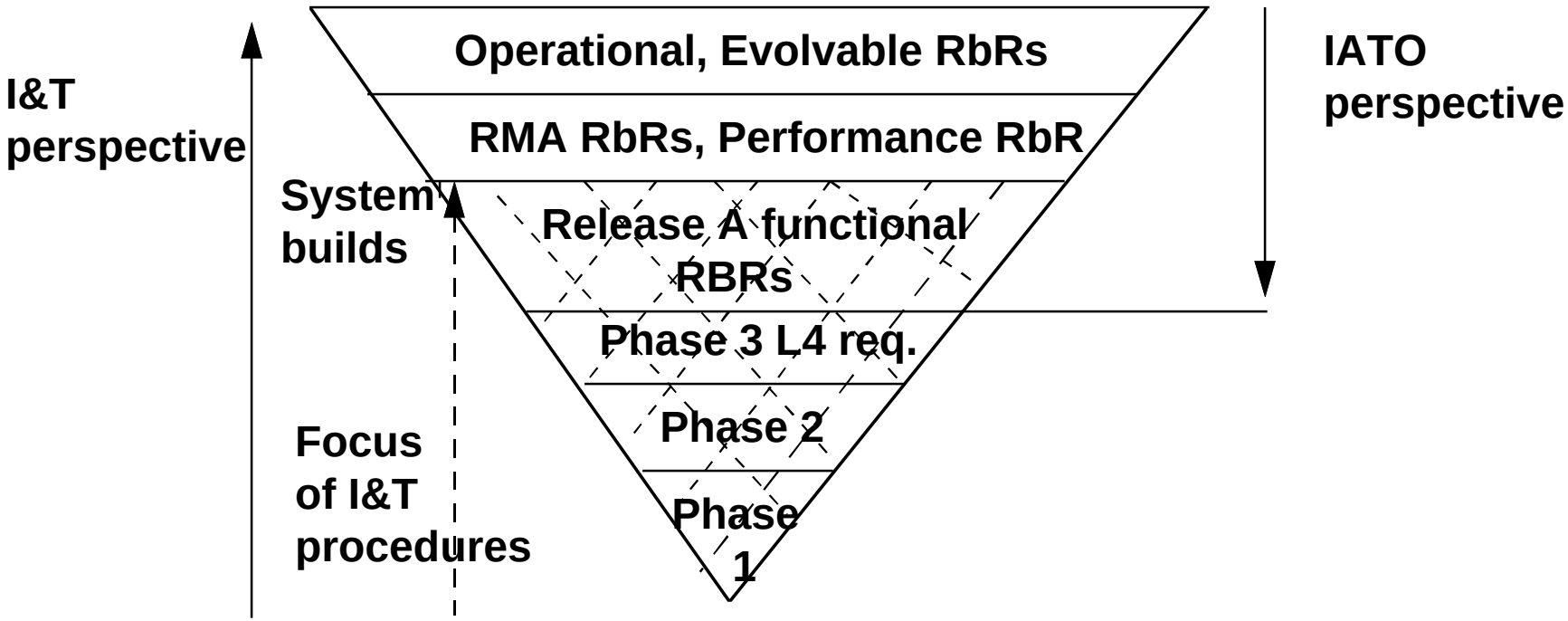


Test case/requirement traceability

- **Level 4 requirements mapped to test cases**
  - **Functional requirements mapped to test threads and builds in I&T procedures document**

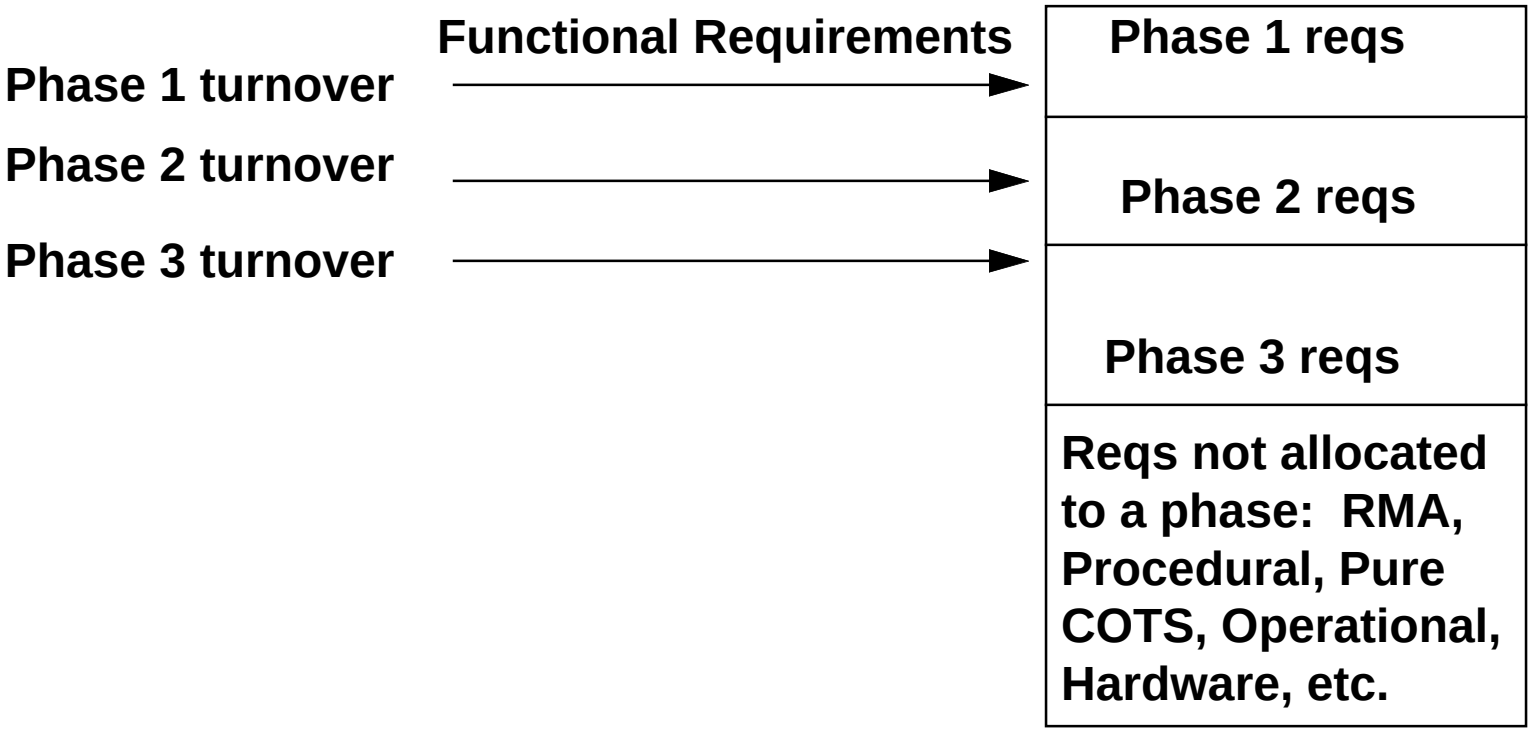
- **Release A RbRs mapped to test cases**
  - **Applicable RbRs mapped to Phase 3 system threads and builds**
  - **Remaining RbRs mapped in IATO test procedures**

I&T Requirement Focus

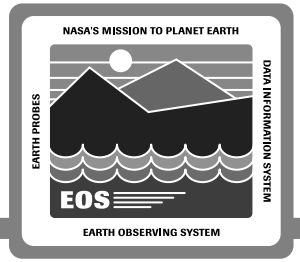


Requirement Traceability

- **Software Turnover Process**
  - **Test cases are mapped to software requirements**
  - **Additional test cases are written as needed to verify requirements not identified during turnover meetings.**

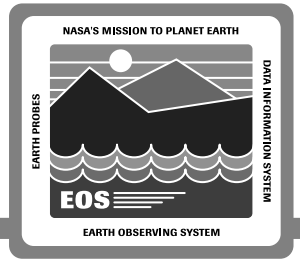


Verification Methods



- **Inspection**
  - **The visual, manual examination of the verification item and comparison to the applicable requirement or other compliance documentation, such as engineering drawings.**
- **Analysis**
  - **Technical or mathematical evaluation based on calculation, interpolation, or other analytical methods.**
- **Demonstration**
  - **Observation of the functional operation of the verification item in a controlled environment to yield qualitative results without the use of elaborate instrumentation, procedure, or special test equipment.**
- **Test**
  - **A procedure or action taken to determine under real or simulated conditions the capabilities, limitations, characteristics, effectiveness, reliability, or suitability of a material, device, system, or method.**

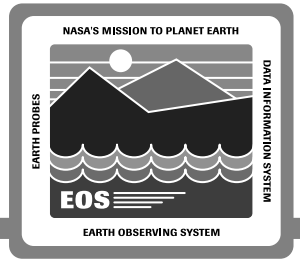
Verification Approach



- **Final verification of the following Level 4 requirement types will be completed by RRR**

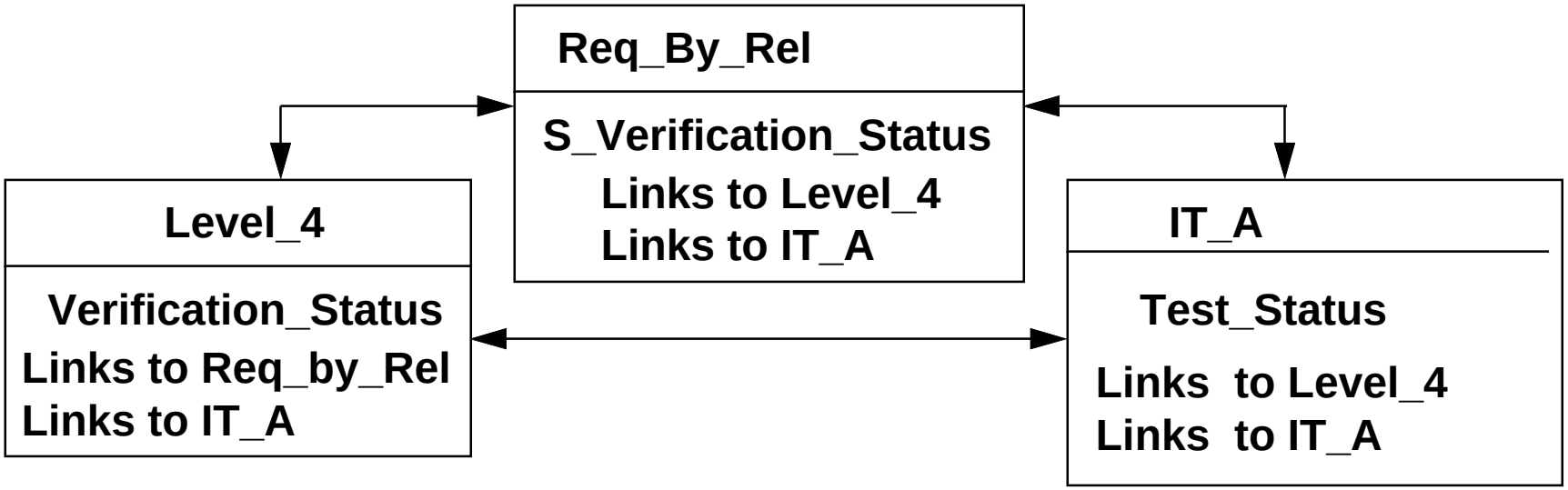
Requirement Type	Verification Method	Verification Schedule
Functional Hardware	Inspection	Tested by CSR, final verification by RRR
RMA	Analysis	Final verification by RRR
Evolvable	Analysis	Final verification by RRR
Performance	Analysis/Test	Final verification by RRR
Operational	Inspection	Final verification by RRR
Interface	Test, Demo	Final verification by RRR
Site Specific	Test, Demo Analysis, Inspect	Final verification by RRR

Verification Approach (cont.)



- **Sample requirement types verified by RRR**
  - **RMA requirements**
    - **C-CSS-00010: The CSS services at the SMC shall be configured to support the SMC function of Gathering and Disseminating System Management Information's availability requirement of .998 and a Mean Down Time of < 20 minutes during times of staffed operation.**
  - **Evolvable requirements**
    - **S-DPS-20040: The PRONG CI design and implementation shall have the flexibility to accommodate Processing expansion up to a factor of 3 in its capacity with no changes to the design, and up to a factor of 10 without major changes to its design. Such expansion in capacity or capability shall be transparent to existing algorithms or product specifications.**
  - **Operational**
    - **The electrical power requirements for DMGHW CI equipment shall be in accordance with the ECS Facilities Plan (DID 302/DV2).**

Verification Approach (cont.)



- Test_status attribute in IT_A class updated in RTM as tests are successfully run.
- Verification_status attribute in Level 4 class updated in RTM as all tests mapped to a particular L4 requirement are successfully run.
- S_Verification_status attribute in RbR class updated in RTM as Level 4 requirements and tests mapped to a particular RbR are successfully run.

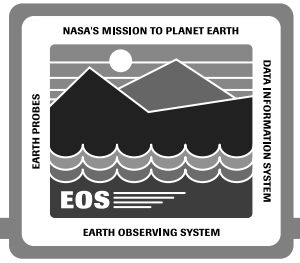
Verification Matrix

- **Verification status will be tracked via Excel spreadsheet**
- **CCRs will be submitted weekly to update the L4 and RBR Verification status in RTM**

RbR	Requirement #	Test Case	Verification Status	Verification Date
PGS-0620			Unverified	
		BS003.001	Unverified	
	S-DPS-40710	Verified	Verified	7/26/96
		TS045.001	Verified	7/15/96
		TS045.003	Verified	7/26/96

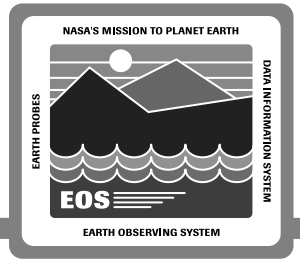
- **CCRs submitted to ECS CCB to update Verification_Status Attribute in RTM as test cases are completed**

Mini-TRR Format



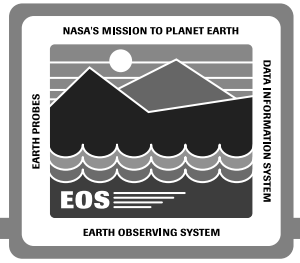
- **Mini-TRR Overview**
  - **Identifies relevant sections in test procedures document**
  - **Provides a brief description of functionality and subsystems to be tested**
- **Software Readiness**
  - **Development status**
  - **Limitations**
- **Test Plans & Procedures**
  - **Proposed test cases to demo at conclusion of phase 3**
  - **Test procedure limitations - based on outstanding NCRs, outstanding software turnovers, etc.**

Mini-TRR Format (cont.)



- **NCRs**
  - **Listing of open NCRs against code under test**
  - **Identification of external drivers and workarounds based on open NCRs**
- **Test Environment**
  - **HW & SW configuration of where tests will be executed**
  - **List of platforms where tests will be conducted (SGI, SUN, etc.)**
- **Wrap-up**
  - **Discussion of reviewers comments**
  - **Comments will be consolidated and posted on ftp site**

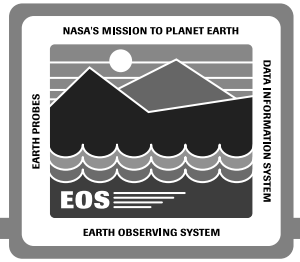
DID Status



- **DID 322-CD-002-002: Release A Segment and System Integration and Test Procedures**
  - **Preliminary version delivered at Release A TRR**
  - **Contains as executed test cases and procedures for Phase 1, 2; preliminary tests for Phase 3**
  - **Contains requirements mapping for Level 4 requirements and RbRs to test cases.**
  - **Comments due to ESDIS by 8/30/96**
  - **Final version delivered at CSR + 1 month**

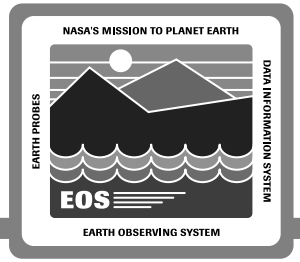
- **DID 324-CD-001-001: Release A Segment and System Integration Test Report**
  - **Preliminary status briefing at CSR**
  - **Final report delivered at CSR + 1 month**
  - **For test streamlining, considering consolidation with IATO DID 412**

Changes Since Ir1 I&T



- Test cases linked in RTM
- Acceptance testing is at the delivered site
- Installation process is refined
- Test Environment = Target Environment
- Target System Configuration
  - Tiger team formed
  - System Configuration specified
  - System Configuration baselined through Release A CCB
  - Baseline Configuration on EDHS
  - Process in place to control configuration

Changes Since Ir1 I&T (cont.)



- **Installation progress to date**
  - **System subdivided into HWCI and CSCI**
    CSCI subdivided into program executables
    Executables mapped to machines
  - **Hardware layout baselined**
  - **Network layout (addressing and filter tables) specified**
  - **DNS, NIS and NFS defined and baselined**
  - **Raid and Sybase database configurations defined**
  - **System backup COTS (Legato Networker) specified**
  - **Operating systems baselined with known patch levels**
  - **Compile/build/compute platforms defined**